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RAPIER (RAPid Image Exploitation Resource) Fire Detection System

A software program that quickly and automatically detects and maps fires from high-resolution commercial overhead imagery.

The U.S. Navy seeks to commercialize U.S. Patent Application 12/777,349 (Method for detecting and mapping fires using features extracted from overhead imagery).

Background

During wildfire disasters, image analysts assist emergency responders by detecting fires in aerial and satellite imagery. Current automated fire detection systems for satellite imagery use low-resolution imagery. For example, MODIS produces one-kilometer resolution images. As a result, large fires and small fires up to one square kilometer appear to be the same size. Current systems that use high-resolution satellite imagery lack automation and require image analysts to manually search for fires, consuming valuable time.

The Technology

The RAPIER Fire Detection System (FDS) is a software program that provides an automated solution for detecting and mapping fires from high-resolution satellite imagery, outputting small-sized, high-quality files that are easy to e-mail or FTP. RAPIER FDS uses complex image processing algorithms to quickly, accurately, and automatically search the visible bands of an image for fires and smoke. In cases of thick smoke, the algorithms analyze the image's near-infrared and/or shortwave infrared bands to locate thermal "hot spots" behind the smoke. The results are output as a shapefile, outlining detected fires on the processed image; and a geo-referenced file, mapping the precise size and location of detected fires onto Google Earth™. Overall, RAPIER FDS provides increased situational awareness for the first responder.

Key Benefits

- Automates the task of detecting and mapping fires in high resolution commercial satellite imagery
- Processes 4-band multispectral data in TIFF and NITF formats such as SPOT 4 and 5, Quickbird, Ikonos, GeoEye, and OrbView
- Outputs shapefiles (.shp and .shx) and Google Earth™ files (.kmz)
- Plugs into the RAPIER Framework, leveraging open source software that allows the user to modify existing algorithms and create new algorithms

Development Status

- Total R&D: $330K and 6 months for RAPIER FDS; $5M and 5 years for RAPIER Framework (including RAPIER Ship Detection System)
- DoD 5000 Series Technical Readiness Level 5: Component and/or breadboard validation in relevant environment

For more information on technology transfer, please contact us at (619) 553–5118 or email ssc_pac_t2@navy.mil

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RAPIER FDS was designed for use in emergency response and natural disaster situations. Other uses may exist such as fire and asset mapping for insurance companies.

Current automated fire detection systems use low-resolution satellite imagery, limiting situational awareness. For example, each 1x1 km box in this MODIS output represents one detected fire.

RAPIER FDS uses high-resolution satellite imagery, increasing situational awareness. This RAPIER FDS output shows detected fires in 2.4 meter resolution imagery.